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REPORT ON EPIDEMIC REMITTENT AND INTERMITTENT FEVER OFFURRING IN
PARTS OF BURDWAN AND NUDDEA DIVISIONS

J. ELLIOT

Calcutta : Bengal Secretariat Office.
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B. L. Chatterjee

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By DR. J. ELLIOT.

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REPORT
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I.—*History in Jessore.*—A peculiar type of fever, called by Natives "Jur Beekar," of the same nature as that now prevalent in many of the large Villages of the Burdwan and Nuddea Divisions, seems to have been prevalent in Jessore for many years previous to its first appearance in the District of Nuddea.

It appeared at Mahomedpore, a large Village on the River Ellen Kallee, about thirty miles east of the Station of Jessore, in the year 1824 or 1825; next at a place named Dalga, on the Cheetra Nuddee; then at Nuldanga, on the Baeng Nuddee, a few years later; and at Chashra, a damp, unhealthy Village near Jessore, still known as an aguish spot, in the year 1831.

Kushba and many other Villages on the Bhyrub River were liable to outbreaks of fever at a much later period than the date abovementioned.

The inhabitants of Gud Ghât, a large Village twelve miles north of the Station, suffered fearfully about the year 1855 or 1856, when many hundreds died before medical aid could be afforded to them, and others fled panic struck from the place.

The Station of Jessore itself, and the Villages in the immediate neighbourhood, have only been healthy during the last ten years, since they were cleared of jungle, thoroughly drained, and the land cultivated under the superintendence and orders of Mr. F. Beaufort, then Magistrate of that place.

It is probably the same type of fever as was common in Rungpore, Dinagepore, Purneah, and some other Districts, which are now, I understand, pretty healthy.

II.—*History in Nuddea*.—From Jessore it would seem to have passed over to the contiguous District of Nuddea about the year 1832 or 1833, attacking first the large and then populous Village of Gudkhally, situated between the Hureekhal and the stagnant River Cobbaduck, twelve miles south of Jessore, on the public road leading to Calcutta.

I am informed that cholera preceded the outbreak for two successive months; that on the appearance of fever many fled from the place: those who remained in the locality suffered fearfully, and large numbers perished.

Goatallee, Khandbeela, Sookpokooria, in the same District, from fourteen to twenty miles north of the last mentioned place, seem to have been the next large Villages which were attacked about five years later. In 1835-36 they are said to have suffered excessively; but I have not been able to hear of their present condition.

In the year 1840 Gudkhally was again attacked by the same type of fever, when its fearful ravages nearly depopulated the Village.

The epidemic is next heard of in 1845-46 at a large Village named Sreenuggur, about twenty-five miles south-

west of Gudkhally, between the Stations of Bongong and Chogda. It continued there for years, and, after carrying off nearly three-fourths of the population, extended eastward to the neighbouring Villages of Gopalnuggur, Bahrapore, and others, which still suffer; south to Digreeah, Chowbareeah, and other places, on the Juboona River; north to Simooleah, Gansaree, and other Villages, within a circle of about five miles.

It seems after that to have become general over the Pergunnah, and about the year 1850-51 it is heard of at Gaurpotha, twelve miles north-east of Sreenuggur. It then spread westward through the Villages of Deboogram, Majerkallee, Mooragatehee, and others, in that quarter, and after nearly depopulating many of them reached Oolah at the commencement of the rainy season of 1856.

Beernuggur or Oolah was then a very large and populous Village, situated on a marshy spot of ground about three miles to the north of Ranaghat, and one mile west of the Choornee Nuddee, having a large Bheel of the same name to the south-west.

At that time it is said to have contained more than 18,000 inhabitants, 10,000 of whom, or upwards, must have perished during the past six years.

From this place the epidemic seems to have diffused itself over the southern part of Nuddea, the north-eastern part of Hooghly, and pretty generally over the whole of the District of Baraset.

During the three following years it extended north from Oolah through Baraset, Bad Koola, and Khamar Simleeah, to within a few miles of the south-eastern part of the Station of Kishnaghur.

In 1859-60 it proceeded west through Phooleah, Nobla, Maleepotta, and a number of other Villages, to Santipore,

which has been comparatively free. Thenec, in 1860, it extended north to Gobindpore, Deegnuggur, and neighbouring places, and since the above period up to date has become pretty general in most of the large Villages immediately south and south-west of Kishnaghur.

South from Oolah it extended through Ranaghat and surrounding Villages (which have suffered but little) to Anoolea, Kaetparah, Jugpore, and others, as far as Chogda, on the River Hooghly, which place it reached in July 1857.

From Chogda, during 1858-59, it continued to spread through the principal Villages on the River, as well as those located several miles in land, as far as Sooksagur, and thence in the same route, devastating many large Villages as it proceeded; it reached Kachraparah, the most southerly point in the Nuddea jurisdiction, during the rainy season of 1859.

III.—*History in Baraset.*—Crossing the Bagar Khal, which separates Nuddea from Baraset, the epidemic extended from Kachraparah to the adjoining Village of Haleeshohur, in Nyhattee Thannah. This was also a very large and populous place, extending south from Kaehraparah, on the eastern bank of the Ganges, to Nyhattee, opposite Chinsurah.

Fever of an epidemic type appeared in these Villages a few months later than at Kachraparah; in the same year (1859) remained there, and in the surrounding Villages, during 1860-61, carrying off numerous victims, and leaving others, who are suffering from its effects at the present day.

During 1860 the Villages of Kantalparah, Bhatparah, and others further south on the Hooghly, were attacked, and since then, during 1861-62, it has gradually found its way to Juggerdul, Atpore, Garoolia, and Moolajore; after which it cannot be said to be epidemic, though the Villages of Isapore, Munnirampore, Chanuek, Titaghur, and many others, as far as south as Khurda, in the 24-Pergunnahs, have suffered more

than usual from intermittent fever during the past rainy season.

Simultaneously with those on the River many Villages in land have suffered equally with those above noticed, of which I shall only mention a few.

South of Chogda are Goiparah, Seemhat, Burro Jagooly, Beroi Sultea Polassy, Dadpore, and others, about ten miles east of the River Hooghly.

On the Sootee Nuddee further south, within a few miles of Baraset, are Suntosspore, Natapole, Soobaloy, Meerhatty, and other Villages, most of which have almost been depopulated.

South of Sreenuggur, on the Joboona River, are Julleesur, Echapore, Goipore, Goberdanga, Khatura, and others, in many of which it has committed fearful ravages during the past three years.

The epidemic appeared in the Station of Baraset and surrounding Villages in the month of July 1860. Thence it has extended east to Badoo, Takerhat, and the Villages in the neighbourhood of Kudumgatchee Thannah; south-east to Mohesserpore, and through a long line of Villages as far as Rajahattee, in the 24-Pergunnahs.

In the Villages of Badoo and others three-fourths of the population are said to have died or deserted their Villages, and those who remain are still sick.

West of Baraset, on the road leading to Barraekpore, it has been most virulent in the Villages of Rungopore, Neelgunge, and Katalcea, during the past rainy season.

South of the same place, Majergram, Neenta, Ghola, and many other Villages, in the vicinity of Dum-Dum have suffered equally with the others, but the Station of Dum-Dum itself is comparatively free.

IV.—*History in Hooghly.*—Although intermittent fever of an unusually severe type seems to have been prevalent in

Keota, Shagunge, and Villages in the immediate vicinity of Hooghly, for the last five years, it did not appear in an epidemic form till the commencement of the rainy seasons of 1860, when it broke out at Bansbaria, Seebpore, Trebanee, and other places on the opposite side of the River, from Haleeshohur, about four miles north of Hooghly.

From Trebanee it has extended west on both sides of the Sursuttee Khal, as far as Mugra, Sathgram, and Hosseinabad; south through Shagunge and Bolagore to Hooghly and Chinsurah, which have escaped, although it is prevalent in the surrounding Villages as far south as Chandernagore and Buddebatty, in the form of severe intermittent and remittent fever, hardly epidemic.

North of Trebanee, during 1861-62, it extended through the Villages of Jeypore, Bagattee, and Nayserai, to Domoorda, Sheejah, and Jeerut, all on the River, as far as Bollaghur.

From Bollaghur and its neighbourhood, since the rains of 1861, it has extended north through Sreepore, Sookria, Somrah, and other Villages, as far as Goopteparah, where it commenced early in the rainy season of 1862.

It now extends west from Bollaghur through the principal Villages *en route* to Pundooah, which it reached in July 1862. In none of them, however, has it been so virulent as in Pundooah, where upwards of 1,200 people have died during six months.

In the Burdwan District, adjoining Hooghly, the Villages of Gopeenathpore and Poopdul, on the Bagheeruttee River, are those in which it is prevalent at the present time.

The Villages of Digumberpore and Mutteearree, on the Matabanga, and Dowlutgunge, on the Cobbaduck River, in Nuddea District, are also suffering severely.

From the above rough Sketch of the rise and progress of the epidemic it would seem to be travelling from the north-

east to the south and west; in the former direction to the 24-Pergunnahs; and in the latter *via* Pundooah towards the District of Burdwan.

V.—*Remarks.*—To have a correct idea of the deplorable condition of many of the Villages abovementioned, and of others I have seen, it would be necessary to visit some of them after they have emerged from an epidemic, like the present, under which they have been suffering for three or four years.

Perhaps some of those in Nuddea present a worse aspect than the others, because they have suffered the longest, but it is only necessary to step from Hooghly to Haleeshohur or Bansbaria to have a pretty fair idea of the effects of a plague, which, if less rapid in its results, is in the end not less fatal than cholera itself.

A glance at the Villages of Oolah, Nobla, Meradpore, and such places, tells that they are doomed, and nothing can be more wretched than the appearance they now present.

The rich and the poor of all ages and castes have suffered alike, consequently dwelling houses of all descriptions in equal proportions are to be seen in various stages of decay and ruin. Many of them have fallen to the ground, and jungle and rank vegetation have sprung up in their places.

Tanks, from long neglect, have gradually filled up with weed and long grass till just enough water has been left in them to favor vegetation during the rains, and assist in the process of decomposition during the dry season. The largest and best of them are now stagnant morasses, which, in some instances, have served as receptacles for the dead, when no other means could be found for disposing of them.

From the natural fertility of the soil favored by damp, want of drainage, and of cultivation, useless vegetation of every description has sprung up, unchecked and unheeded to such an extent that roads and pathways have disappeared.

In some places even light and ventilation have been so much interfered with by the spreading of boughs, clumps of bamboos, tangled creepers overhead, and by dense masses of matted brushwood underneath, that such thickets are no longer fitted as habitations for human beings, and wild animals and beasts of prey have found shelter under the recesses that have been formed.

Many large "Barees," in which there were formerly thirty and forty residents, have now been left with perhaps one solitary occupant; whole Mohallas and Streets have been deserted; and large Villages which formerly told their residents by thousands can now almost number them by hundreds. In this manner many of the largest and most populous places in the three Districts have been decimated by a disease which has numbered its victims by thousands, and which has left three-fourths of those who have escaped from immediate death to linger on for a few months, or perhaps years, in state of misery and despair, at last to fall victims by one of the numerous sequenees, which are perhaps productive of as great an amount of mortality as the disease itself.

The names of a few of the Villages which I visited, in which the mortality has been greatest, have been mentioned in the course of the history of the epidemic, but there are hundreds of others in the same state, some of which I have seen, others not. In few instances (Pundooah perhaps excepted) have I been able to procure even a tolerably correct idea of mortality, as no account was kept at the time, and all the information that can now be obtained on the subject is only hearsay. The reports given by the Police are full of error, and only approximate to the truth. They either take no trouble to obtain correct information, or the people, I believe, in many instances, are averse to giving it without knowing exactly what use is to be made of it. A pretty correct, but incomplete, Return

of a few of the large Villages in Bausbaria and Nyhattee Thannahs near Hooghly has been given, but of by far the greater number no account has been rendered. Villages in Nuddea and Baraset are in a worse state than those in Hooghly, because they were attacked earlier, and, as is usually the case, the efficient causes seem to have acted with greater virulence at the commencement than towards the close of epidemic.

Epidemics during different seasons and in different climates have been distinguished by certain peculiarities. The chief characteristics of the present one, and the circumstances by which it has been influenced and modified, may be said to be connected, first, with the localities in which it has occurred; and, second, with the constitutions and habits of the people among whom it has prevailed.

VI.—*The causes of the disease may be divided into predisposing and exciting.*—Of the former I shall mention first some of the endemic influences most likely to cause the disease in the localities in which it prevails.

1.—*Sites of Villages.*—As the sources of malaria are, I believe, endemic in most of them, the situations of Villages, whether on bheels, khals, or on the banks of stagnant or running Rivers, do not seem to have influenced the prevalence of the disease in them as much as might have been expected.

Perhaps, of all others, (Oolah excepted), those that have suffered the greatest ravages have been situated on the banks of stagnant Rivers filled with vegetation and weeds of every description, on either bank of which, when the water subsides after the rainy season, there is exposed a large extent of marshy ground teeming with fertile sources of poisonous emanations affecting all in the vicinity.

Others are located on bheels, or near them, many of which contain only a certain amount of stagnant water, the greater portion of which dries up every season, leaving a considerable

extent of malarious surface to be acted on by the rays of a powerful sun.

Houses suited on the outskirts of such Villages do not seem, however, to have suffered more than those in the interior, in some cases rather less.

Most Villages are surrounded by a sheet of water during the rains, with extensive rice cultivation all round them. They appear to be pretty healthy during the time the crop is growing, but after it is cut the soil, which is covered with both animal and vegetable remains, dries, cracks, and miasmatic emanations probably rise through the fissures.

Those on the banks of large Rivers, although high and apparently above the River level, continue very damp throughout the year, and are often flooded during the rains without a rise of the River over them.

This may be accounted for by the many hundreds of tanks they contain, or perhaps, during the periodical rise of the River, the water forces itself up from below through the porous soil.

From want of drains and dead level water stagnates in parts of all Villages, percolates into the soil, and when it becomes saturated the remainder accumulates on the surface to undergo a process of slow evaporation.

2.—*Nature of the Soil.*—In all places the soil is alluvial and very much alike in most Villages. In localities near Rivers there is generally a spongy upper surface composed of a mass of decayed animal and vegetable matter. In other places the surface is heavy, mutteal, or clay intermixed with sand, or there may be a predominance of sand; but these circumstances do not seem to have influenced the diffusion of the present epidemic, for the soil in Nuddea contains more sand, and is drier than that of Hooghly, yet the disease prevails equally in the Villages of both.

On Churs, too, where there is much alluvial sand, and almost no vegetation, the residents suffer as much from fever as those in the old Villages. The people who reside on these Churs are naturally a healthy race of men (Boonas) from Bancoorah and other Districts, who have settled there for the purpose of preparing the land for Indigo cultivation.

3.—*Want of Cultivation of Land.*—One of the principal causes of this epidemic is the want of cultivation of lands adjoining houses and Villages, and the harbouring near them of thick deciduous jungle and vegetation. Nothing contributes so much towards the health of a country as cultivation; and it is known that fertile and highly cultivated land when speedily allowed to run to waste becomes unhealthy to reside upon. The same may be said of land which has not been under cultivation for a series of years, if thickly populated, and partially allowed to run to waste.

This seems to be verified in the present instance, for I have almost invariably observed that the epidemic has appeared first, and has been most virulent in the oldest and most populous Villages, the lands in and around which have not been under cultivation or exposed to the rays of the sun for years.

During each season every kind of vegetation springs up, leaves fall, and various animal substances accumulate, decompose, and putrify, by the aid of heat and moisture, and afterwards, during the rains, percolate into the porous soil.

The earth becomes saturated with dead organic matter in various stages of putrefaction and decay, till at last, when evaporation takes place after the periodical inundation, poisonous emanations arise, which, if not acting at all times as specific causes of disease, must exercise a prejudicial and depressing influence on the constitutions of those long resident in such localities.

4.—*Position and overcrowding of Houses.*—Probably from increase of the population, previous to the outbreak of sickness, there had also been a great increase in the number of houses in many Villages, which, in many instances, have been huddled together, obstructing streets, drains, and pathways, without any system or regard to ventilation.

There is a want of light and ventilation in the best of Native houses, and among the poor such things are not thought of.

Houses are generally overcrowded during health, and are still less adapted to accommodate all the members of a family at once, when prostrated by sickness, as has often been the case.

In this manner, by overcrowding, exhalations from the bodies of the sick, from the secretions, or perhaps from the excretions, which are frequently left in close proximity to them, have acted as powerful exciting causes of disease, and have tended to promote its diffusion among them in an unusual manner.

In some instances so foul has been the atmosphere in these dwellings that I have not been able to remain in them even for a short space of time.

5.—*Excess of Vegetation and Bamboo Cultivation in the Vicinity of Houses.*—In all places there is an excess of foliage and useless vegetation of every description, so much so as to be incompatible with the maintenance of the public health.

Trees, both large and small, clumps of bamboos, plaintain and mangoe groves, shrubs of every sort, and all kinds of jungle, are allowed to grow up without check in the vicinity of their dwellings. No rigorous measures have been taken to put a stop to this, and the ordinary attempts at clearing such places are often both imperfect and unreasonable. If

benefit results it is only temporary, for, instead of uprooting the jungle, the most conspicuous bushes only have been cut down during the rainy season, and have been left to decay on the spot.

Much of what has been cut takes root on its own account, and the old roots spring up with greater vigour the following season.

Natives favor the growth of jungle and vegetation round their houses for purposes of concealment, and, in the absence of a clump of bamboos or a natural patch of jungle, a hedge is planted of the "Bharanda," or some other shrub which grows up with amazing rapidity, eventually completely shutting out the means of ventilation.

6.—*Bad Water and state of Tanks.*—The water in many of the largest and best tanks has deteriorated from want of care and proper cleaning, and, as most of them have not been re-dug for years, it has on that account gradually decreased in quantity, till at most a few feet of water only remains.

The greater proportion of the middle sized tanks in many Villages are hidden from the influence of the sun and wind; and, owing to the constant fall and accumulation of dead leaves and broken branches from the trees, and bamboo clumps overhanging them, the water in some has become discolored, in others decomposed, and in all it is unfit for use. Yet many households depend upon such sources for their daily supply of this most necessary element.

As the water decreases vegetation increases, rank weeds and long grass take root and spring up, till at last a foul swamp takes the place of what was once a tank.

The indiscriminate use of tanks for bathing and other purposes by all classes of people leads to the deterioration of the water, and ultimately renders it unfit for use for drinking purposes.

Innumerable small ponds, pools, and holes of various descriptions, containing water of different hues and colors, exist in every Village, many of which have been excavated for the purpose of procuring earth for erecting houses in their immediate vicinity. So long as these excavations contain water, they provide the house with all that is required for cooking, bathing, and all other purposes, except, perhaps, drinking, at least among the lower classes.

Such pools on being disturbed while they contain water emit gases, of which the predominating elements are probably Sulphur, Carbon, and Hydrogen, in various proportions.

The water is, as we know, swarming with Infusoria and other animated organisms, the life of which, as evaporation advances, must cease. During the process of putrefaction and decay of the organic remains, it is to be presumed that gases may be produced still more poisonous than the former, which will be likely to prove obnoxious to the health of all who are subjected to their influence.

In connection with this subject I may mention that only a few days ago thirty healthy men were sent from Hooghly to Bansbaria to remove weeds from the surface and edges of some of the numerous collections of stagnant water in that filthy locality. Within a few days five of them had died of cholera, the others only escaped by a timely removal from the place. Several of them have died since their return. It is probably owing to the same want of care and of re-digging that a scarcity of water is found in the wells of Villages where there are no tanks.

7.—*Drainage in Villages.*—There is a complete want of any attempt at drainage in all Villages; the consequence of which is, that many of those whose site is naturally low are partially under water during the greater part of the rainy season; roads and pathways, if any exist, are frequently in a

state of submersion, so that the only means of communication between house and house is through mud water.

8.—*Burial Grounds.*—The burial places for the dead in Mussulman Villages, and Burning Ghâts in those of Hindoos, are far too near the habitations of the living.

In most instances the dead are buried in the immediate vicinity of their late dwelling-houses, and always in some spot within the boundary of the Village, which ought not to be allowed.

At Pundooah, during the past year, where more than a thousand people (many of whom were Mussulman) died within the short space of six months, the ordinary burial grounds could not contain the dead; and in the vicinity of most houses are now to be seen the graves of two or three or more of the dead relatives of the inmates. On the banks of old tanks, too, and in low marshy localities within the Town, bodies have been thrown into the ground by hundreds, with a covering of only a very few feet of earth above them, from which, doubtless, issue all kinds of poisonous, gaseous emanations, the products of animal decay, which tend to diffuse and excite fresh disease.

In Hindoo Villages, as I have said, during the late epidemic, the banks of large tanks, or nearest khals, in the immediate neighbourhood of Villages, have been made the receiving places for the dead in large numbers; and during the seasons of greatest mortality the state of the Burning Ghâts has been too horrible for description. Even, during the late season, carcases in all stages of decay have been seen unburnt and unburied, not further off than Kachraparah or Trebance. Doubtless the same is the case everywhere. At Somrah the people complained that the water in a khal there had become offensive from the numbers of dead that had been thrown into it, and in several places I have seen a seum of oily looking

substance on the surface of the water. In other Villages when the last members of the family have died the bodies have been left on the spot, there being none to remove them.

In addition to the usual sources of malaria, effluvia and emanations from decomposing animal remains have been added, which must have tended to establish disease of a malignant type in localities already foul and bad.

VII.—Causes influencing the disease among the people.

1. *Food.*—Bad food and irregularity in the hours at which it is taken are powerful predisposing causes to disease, particularly among the poor. The want of properly cooked food is one of the many causes of relapses so common among those who are suffering from this disease. The use of unripe fruits, putrid fish, and many other substances equally unwholesome (I might have said poisonous) not only predispose to, but tend to, bring about disease. Bad drinking water, too, may be brought forward as one of the most prominent causes, and we know in how many places it is not procurable of good quality.

2. *Clothing.*—Seanty clothing at all times, especially during the rains, and the want of proper protection from the cold during sleep in the cold season, ought to be mentioned as a predisposing cause of disease among them. It is certainly a prominent cause of many of the sequelæ consequent on this fever which prove so intractable.

3. *Habits of the people.*—The habits of the lower classes of Natives in particular with reference to cleanliness, and of all classes with regard to conservancy, both in and out of their dwellings, are far from tending to the promotion of health.

The drainage in the houses of the rich, and the condition of sewers and of the pipes which lead to them, are matters which ought to be looked to.

The general conservancy arrangements of a Bengalee Village are too well known to require any comment from me. Suffice it to say that they are conducted on principles attended with the smallest amount of trouble, and which are the least likely to prove conducive to the health of a large community.

4. *Sleeping on the ground.*—In Villages naturally damp, the houses, although raised above the level of the ground, are also damp; and, as all the poor and many of the middle classes sleep on the floor, a piece of mat only intervening, it can be supposed that this is a predisposing cause of disease among them. Those, however, occupying double-storied houses have not suffered less than the others.

5. *Fear.*—The influence of fear and depression on the minds of the people during epidemic periods is well known to exercise a prejudicial effect on the body in rendering it less able to oppose and withstand disease. The minds of many of the people at the present time are filled with anxiety and alarm, dreading a fresh outbreak of the epidemic during the approaching rainy season.

6. *In addition to all these, peculiarities of season and unknown changes in the atmosphere may have tended more to bring about this epidemic than we are, generally speaking, disposed to admit.*

Intelligent Natives attribute it to the excess of rain which has fallen in these parts during the last three or four seasons, and to the want of severe thunderstorms, in consequence of which the soil has remained damp during a longer period than usual, and the atmosphere has been allowed to stagnate, and noxious miasms, the products of animal and vegetable decomposition, attracted by the trees, have accumulated in the lower strata of the air. As the rainfall of a country and the dryness or moisture of its climate are known to be

influenced, more or less, by the extent of its woods and forests, it is just possible that, owing to the excess of trees and vegetation during late years in these Districts, this may be one of the causes; but in the absence of correct Tables of Meteorological Observations, shewing the fall of rain, on which I can place dependence, I am not prepared to give an opinion on this subject.

VIII.—Exciting Causes.—In the history of a disease of a peculiar type like the present, which, after prevailing extensively in one District, has extended to the community of another, in many respects closely resembling and similarly circumstanced to that of the first, or after a time has returned to the Districts and localities where it had previously been, there is good reason for the supposition that its origin is indigenous to the localities in which it prevails. Although, perhaps, at first, strictly speaking, endemic, the disease is so general in the three Districts that it may now be said to have become epidemic, and it may be supposed to arise from the effects of a specific poison by some means introduced into the system (probably through the lungs), the origin of which may be looked for either in exhalations or secretions from the bodies of those previously affected with the same disease, or in malarious emanations rising, under peculiar circumstances, from certain parts of the earth's surface.

1.—There are no certain proofs in connection with the present outbreak to shew that contagion has been the means by which the disease has been propagated and diffused, otherwise we should probably have heard of its importation from one place to another.

2.—The susceptibility of the disease is in no way diminished by its once having occurred in the system: on the contrary, by fresh exposure, it seems to be more easily re-produced than before.

3.—It would appear, also, that free communication has taken place between sick and well, without apparently (in the chronic stages at least) any tendency in the disease to attach itself from one person to another who has not been in the tainted locality.

IX.—On the other hand, all the concurrent local circumstances which are generally supposed to favor the development of malaria are present in full force in most places I have visited; and, although the same may be said of most Villages in Lower Bengal, yet in those in which the epidemic has committed the greatest ravages they predominate to an unusual extent, in some more, some less; sufficient in all to account for great sickness and mortality. The following are a few of the circumstances which tend to shew that the exciting cause is malaria:—

1.—The partial distribution of the disease and its prevalence within certain boundaries, *i. e.*, in certain Districts, or in particular localities of them only, in many respects similar to one another.

2.—The absence of the disease from those who avoid such localities, and the comparative immunity from it of certain large Villages, such as Santipore, Ranaghat, Chinsurah, Dum-Dum, and other places in which apparently the efficient causes do not exist, at least to such an extent as in the other places.

3.—The benefit which is usually observed to result to the sick by a removal from the locality or District in which the disease has been contracted.

4.—The almost certainty of strangers being attacked by the disease after a certain period of residence in one of the infected localities, of which there are numerous instances.

a.—Of healthy Burkundauzes from the Upper Provinces having been sent from the Thannah of Ranaghat (in which

place there is little or no epidemic fever) to reside at Oolah, who, after remaining for a short time in the place, have been attacked with fever, complicated with enlargement of the Spleen, which frequently has not left them so long as they have remained in Lower Bengal.

b.—Of two Native Doctors sent from Calcutta to Oolah previously in good health, both of whom suffered, one having nearly died.

c.—Of the other Native Doctors at Kachraparah, Trebanee, Pundooah, and Somrah, all of whom suffered from the disease during their residence at these places.

d.—Of several of my own servants, who accompanied me into the affected Districts, all previously in good health, having taken the disease, in one of whom it could not be checked without a removal from the locality.

e.—Of people having come from Calcutta, previously in good health, to attend upon sick relatives and friends, who have taken the disease after a short stay in one of the localities, and have benefited by a return to Calcutta, but on returning to their Villages have again taken the disease and died.

There is a want of evidence to shew that the disease has attached itself from one person to another, who has never visited one of the tainted localities.

X.—The exacerbations and remissions of the epidemic have occurred at such periods of the year as would have been expected from what is known of the efficiency or otherwise of the exciting causes of the disease at these times.

Thus the months of June and July are known to be those during which the epidemic has generally made its first appearance at many of the leading places. This is what would have been expected to be the case, as, during the evaporation which takes place after the earth has been

moistened by the first heavy fall of rain of the season, febrile emanations are most likely to arise.

At Bansbaria and many other places in these Districts the outbreak of the epidemic is attributed to the heavy fall of rain which preceded it, and which lasted for three successive days in the month of June 1860; fever having commenced during the following month.

September, October, and part of November, are the most insalubrious months of the year, and it is then that the morbid poison shews its highest degree of intensity and the mortality is greatest. At that period the atmosphere is heavy and moist, favoring the stagnation of malarious vapours. The temperature also is high, and evaporation is taking place from a spongy soil, saturated with decomposing organic remains after the last heavy fall of rain of the season. In consequence of the numerous fasts and privations in connection with their religious observances, to which many of the better and most of the lower class of Hindoos subject themselves at this period, they are on that account more predisposed to disease at this season than at any other.

The intermediate months are not so unhealthy; but from 15th June to 15th November may be said to be the fever period.

The epidemic abates during the hot weather, when the poison seems to be dissipated or diluted by the heat of the sun.

XI.—*The disease itself.*—The principal features by which the disease has been characterized in its worst aspects have varied vastly from what we have usually been accustomed to observe in fevers supposed to result from malaria. Yet in its milder forms as it has occurred in many of the smaller Villages, and as it is frequently to be seen now, it differs little from the ordinary intermittent and remittent fevers,

aggravated by local circumstances, with which we have generally to deal.

As seen in its worst phases the fever may be said to have assumed a "congestive remittent type," with a strong tendency to congestion of some vital organ, generally, in the first instance, of the brain and lungs.

In milder cases the febrile excitement is not so great, but still of a remittent character, with a tendency to congestion, ending in inflammation and ultimately change of structure, either of the Liver or Spleen, or of both in adults, and of the mucous membrane of the bowels in children.

The cases with which we have chiefly to deal are those in which the acute symptoms have passed away, the fever having become generally intermittent, frequently of the tertian or quartan type, or occurring at intervals of from five to fifteen days.

The complications are chiefly enlargement of the Spleen and Liver or both. The former most common; but those of the respiratory organs and of the abdominal viscera are by no means uncommon in children from one to ten years of age.

XII.—*Symptoms*.—In detailing the symptoms I shall only mention a few of the most characteristic features, as I have seen no single case from beginning to end, and consequently have not had an opportunity of noting down so clearly as I should have wished, or as I might have done in a Hospital Ward, all the minutiae of a case.

It is probable that, in most instances, a premonitory stage, or state of general depression and malaise, had preceded an attack, frequently unnoticed by the people themselves.

In some instances, as at Gudukhalee and other places, the minds of the people had been depressed by the appearance among them of cholera, while in others a severe type of

intermittent fever, almost imperceptibly merging into remittent, had been prevalent for some months immediately preceding the outbreak. The first symptoms are generally described by a feeling of cold about the body, while the eyes, hands, and feet, are hot and burning.

This is succeeded by a severe shivering fit, and then follow the other symptoms of the cold stage of fever, so intense in the worst cases as to lead to depression of all the vital energies.

Great muscular prostration and rapid nervous depression supervene (sometimes attended with nausea and vomiting) to such an extent that the person dies without rallying.

In such cases the poison must have been latent in the system, acting as a sedative on the vital powers, for some time previous to the appearance of the outward symptoms.

In other cases the symptoms characterising the cold stage are less, but reaction is excessive; the pulse continues full, the skin dry and hot, severe headache, or darting pains in the forehead or sides of the head, are complained of; the eyes become congested, the face suffused, delirium sets in, and death takes place by coma in the course of thirty-six or forty-eight hours; or during reaction the respiratory organs become affected, difficulty in breathing ensues, mucus râles set in, and death takes place rapidly by congestion of the lungs and asphyxia, without any other symptoms having shewn themselves.

The greater number of cases are those in which the ordinary symptoms of severe remittent fever are succeeded after the stage of shivering has passed by heat and dryness of skin, headache, flushing of the face, pain in the backloins and lower extremities, with a foul tongue and secretions altered or suppressed.

These symptoms abate and return without any actual cessation, the periods of exacerbation and remission varying in different cases.

If the crisis does not occur from the fifth to the seventh or ninth day the fever continues from seventeen to twenty-eight days, or more, after which if the patient does not recover a low type of fever is established, and he perishes with all the symptoms of typhoid fever.

The first symptoms of recovery are marked by no apparent crisis, the skin from being dry becomes a little moist, the great thirst abates, and there is an appearance of moisture and redness round the tip and edges of the tongue, which gradually cleans, and the skin of the lips peels, or is picked off. A state of great general debility follows, attended with want of appetite, anorexia, and a disinclination for food, a desire for acids, or something to give taste in the mouth.

If the Spleen has been the organ to which there has been the tendency to congestion tenderness is evinced on pressure, and enlargement has begun to be perceptible. Either, owing to the state of congestion, or of sub-acute inflammation which has been established, or owing to imperfect elimination of the poison from the system, a relapse takes place, and fever is established, which may assume any type between intermittent and remittent. With each attack of fever there seems to be a fresh determination of blood to the organ, and an increase in size. In the case of the Spleen it attains an enormous size, frequently filling a large portion of the abdominal cavity.

If the Liver has been affected there is generally great tenderness over that region, attended with nausea, anorexia, and a yellowish tint of skin.

A cachectic and anaemic condition is now established, fever recurs from time to time, the skin has assumed a yellowish tint, indicating a changed and diseased state of the blood.

The tongue, gums, and conjunctivæ, have become pale and bloodless, the extremities wasted and œdematous, the abdomen increases in size, the skin becomes dry and cracked, and the patient lingers for a few weeks or months, as the case may be, and ultimately dies of Asthenia, if no bowel complication occurs.

Instead of remittent fever, intermittent may be the type which has been established from the commencement; between them there are all grades, but in all there is the same tendency to fresh accessions of fever and to local congestions, particularly of the abdominal viscera.

Complications of the Lungs are by no means uncommon in the early stages of the disease.

Complications of the Bowels are not so common in the first instance, unless in children; but even in them such attacks are not characteristic of the disease.

XIII.—Sequelæ of the Fever.—1. Dyspepsia and want of appetite often continue for a long time after an attack, with a craving for various kinds of unwholesome food, the indulgence in which ultimately leads to an attack of Diarrhœa or Dysentery, to which there is remarkable natural tendency, especially in cases in which the Liver or mucous membrane of the bowels had previously been implicated.

Or, perhaps, on exposure to cold and damp, or without any apparent cause, a sort of mucous Diarrhœa is established, which it is almost impossible to check, and this, by reducing the little remaining strength, hastens the fatal event.

2. Œdema of the lower extremities and general Anasarca are generally the last of the sequelæ which usher in the

termination of the disease, but some wonderful temporary recoveries have taken place even at this stage.

3. The Parotid and sub-maxillary Glands sometimes enlarge and continue hard for a long time without much tendency to the formation of pus while the fever lasts: they are generally to be resolved by fomentations and Iodine.

4. In old and debilitated subjects, and particularly in children, a peculiar form of inflammation, resulting in rapid ulceration and sloughing of the mucous membrane of the mouth and muscles of one side of the face, is apt to take place, exposing the bones and teeth of that side, and frequently terminating by hæmorrhage from the facial artery.

5. Sub-acute attacks of Pneumonia, Bronchitis, and other diseases of the respiratory organs, are very common during convalescence, particularly at the commencement of the cold season. The results of previous attacks of inflammation in these organs are doubtless more apparent to those who have been more immediately connected with the treatment of the disease in its chronic stages.

6. By far the most frequent of the sequelæ of this fearful disease are the enlargement of the Liver and Spleen, particularly of the latter.

Every fresh attack of fever is attended with further congestion and enlargement, ultimately ending in change of structure and organic disease of these organs, accompanied by a cachectic state of the system and deteriorated condition of the blood. The Spleen often increases to an enormous size, at first soft, so long as there is only congestion of blood, ultimately becoming hard, when, by the withdrawal of the fibrinous element from the blood, a tissue of low organization has been formed.

XIV.—Treatment.—Hundreds of cases terminated fatally without medical aid, and the fatal result in many more was

hastened by the injudicious treatment and interference of ignorant and unqualified Native Practitioners who now abound in every Village.

Quinine is known by young and old to be the specific for malarious fever, and the remedy was tried at all stages of the disease without any preparatory treatment, and failed to have the desired effect. It is now sold at exorbitant prices by almost every Native shop-keeper in the Mofussil. Although resorted to by all at first, people have now lost faith in it, as it is said to increase the tendency to local congestions without checking the fever, which I believe to be the case.

I have not seen any of the worst cases which proved rapidly fatal; but am informed that the symptoms varied little from those of cholera. No treatment was available in most instances owing to their speedy termination. Mild stimulating treatment during the stage of excessive depression, and the cold affusion or leeches to those in whom reaction was excessive, might have been of service.

In cases of remittent fever that I have seen there was little to be done, after giving a laxative dose, beyond removing the patient from the close and confined atmosphere in the interior of his dwelling to the verandah, or some more airy part of the house, and thus place him in a more favorable condition for recovery.

The next point is to watch to which of the internal organs there is the greatest tendency to congestion, and to counteract and oppose that by every possible means within our reach. As the Spleen is generally suspected, special attention is to be directed to that organ, and counter irritation by blisters, repeated if they can be borne, are urgently demanded.

The use of such remedies as are known to lower the pulse, favor the action of the skin, and increase the flow of urine, and other secretions, during the critical periods, may be used

with advantage, but strong purgatives and other powerful remedies cannot be borne owing to the tendency to bowel affections.

Shaving the head, sponging the surface with tepid water, or with vinegar and water, are grateful to the feelings, and lessen the tendency to cerebral congestion.

Quinine in the early stages of the disease is of no use, and only increases the tendency to local congestions; but it may be given with great benefit as a tonic after the fever and the local symptoms have been subdued. Even, in cases where there are partial remissions, and the type of fever has become intermittent, there remains the same tendency to local determinations of blood, which must be overcome before Quinine is to be administered; for this purpose repeated blisters are the most efficacious remedies.

In cases of remittent fever, attended with cerebral complications, depletion cannot be borne beyond the application of a few leeches; if there is much flushing or fulness, pain in the forehead or temples, cold affusions, the application of ice and cold sponging to the head are the best applications, to be followed by blisters, if there is a tendency to drowsiness and delirium in the later stages of the disease.

In complications of the respiratory organs shewing themselves early, the application of large blisters, both in the acute and sub-acute stages, are demanded. Such attacks may be kept in check by the use of *Ipecacuanha* Wine and other suitable remedies. In chronic cases, attended with Hepatic and Splenic enlargement, the fever and complications must be attended to simultaneously. Some of the preparations of Iron, and small doses of Quinine, in combination with one of the Mineral Acids, and a bitter vegetable infusion, answer well. The action on the bowels may be kept up by the addition of Salts if necessary, but more

frequently it has to be kept in check, owing to the tendency to Diarrhoea; if so, Dover's Powder, or Compound Chalk Powder, and other suitable remedies, must be made available.

In cases complicated with chronic enlargement of the Liver the use of Nitro Muriatic Acid in a bitter decoction is of much service, with the addition of a few drops of Laudanum, if there is a tendency to Diarrhoea. External counter-irritation is necessary in all cases with complications when it can be borne, but there is often a fear of sloughing of the blistered surface. In chronic cases of fever, without enlargement of the Spleen, the *Liquor Arsenicalis* and Bark are useful, small doses of Quinine still more so.

The use of Muriate of Iron in combination with small doses of Quinine is beneficial in reducing the Anasarca, by increasing the action of the bowels and kidneys, but care is necessary, as it often purges violently. Dysentery and Diarrhoea are to be treated by the usual remedies; but it must be borne in mind that most chronic cases which have come under observation have been of the poorest class of people, in whom the disease and all its complications have run their full course without any care or medical treatment, and in whom not only fever, but enlargement of Liver, Spleen, and Dysentery, are all combined.

The most that medicine can do in such cases is only to alleviate for a time.

In the treatment of such cases all our best endeavours frequently fail so long as the victims to this disease remain in such localities. Convalescence, at all times tedious, is indefinitely protracted by constant exposure to the exciting cause of the disease, and, as attacks of Diarrhoea or Dysentery are brought on by the slightest exposure, many die during the cold season from want of proper covering, care, and attention, which are so requisite during recovery from all diseases.

The preparation of the daily meal becomes a matter of difficulty to people already reduced and in the last stages of a long and protracted illness; and as there are hundreds of instances where only one solitary individual is left of a numerous family, and many more, in which the one cannot assist the other, there is no where and no one to whom to look for assistance.

All the misery attending on a plague like this can only be known to those who have actually been on the spot, and who have seen from day to day in their different phases the sufferings to which the poor in particular have been subjected.

XV.—Means to be adopted for arresting the progress of the disease and preventing its return.—Without a steady and determined system of conservancy and sanitary reform in the affected Villages and their vicinity, by which such of the sources of malaria as are known to exist shall be removed, all other efforts that may be put forth to arrest the diffusion and progress of this epidemic will be unavailing and ineffective. Unfortunately these measures cannot be carried out without entailing considerable expense and causing some inconvenience to the community that is to benefit by them. Owing to the apathy and indolence of the greater proportion of the wealthy class of people, and to the want of any system of Village responsibility among them, it is apparent that nothing can be expected of the inhabitants if left to themselves.

Should, however, the Government think proper to provide the necessary superintendence in carrying out the work, I think the Zemindars and other men of wealth are bound to come forward in their respective Villages and provide the means and money necessary to restore to a habitable condition the places which, partly by their neglect, have been allowed to run to waste and ruin. If this is done, and if the headmen are afterwards made responsible for the sanatory condition of

their Villages, I feel pretty confident that the measures now to be recommended, if steadily and rigorously carried out, will not only have the effect of removing the present disease from among them, but will lead to the permanent improvement of the localities in question.

Poor Villages, and those which have almost been devastated, must either be cleared at the expense of Government, or by Prison labor, as may be thought best.

XVI.—The measures I should recommend may be stated in a few words:—

1st.—The removal of superabundant and useless trees, shrubs, &c., of bamboo clumps, and all plantain groves, from the vicinity of houses and villages, which, by being in excess, obstruct light and ventilation.

The pruning and lopping off of the supernumerary branches of trees and the thinning of bamboo clumps and fruit trees that may be left.

Trees and bamboos overhanging tanks, thereby destroying the water by the constant fall of their leaves into it, to be uprooted and removed.

The uprooting and entire removal by burning of low bushy jungle, vegetation, and rank grass of every sort, during the present hot weather, to be left off when next rains set in.

2nd.—Certain of the largest and best public tanks in various parts of every Village to be re-dug by the people collectively, so as to afford a good supply of water to all parts of the Village.

Proprietors of tanks to re-dig them, if it be considered necessary, or to have the option of filling up their tanks, if they cannot re-dig them and keep in proper order.

Supernumerary and useless tanks to be filled up, and those not requiring re-digging to be thoroughly cleaned and put in proper order, at least twice every year.

Tanks to be dug to the water level in several places, so as to ensure a good supply for some years to come: the water at present contained in them to be drained off if bad, as in most instances is the case. All excavations, small neglected tanks, and other pools in the vicinity of houses, many of which contain putrid water, to be filled up.

Private tanks, khals, garhs surrounding Zemindars' houses and compounds, to be re-dug and afterwards to be kept in proper order.

Drinking water tanks to be separate from those used for bathing and other purposes.

3rd.—Villages to be provided with proper and efficient drains running towards the River nearest khal or bheel as the slope may be. A few large drains or khals should be constructed at some distance from one another in every Village, if necessary, for the removal of the bulk of water. Smaller surface drains should communicate with those from every part of the Village. All drains should be cleaned out at least twice a year.

4th.—Free communication to be facilitated in Villages by the construction of a few good roads and raised pathways, with drainage on either side. The passages, narrow roads, and foul streets between houses, to be cleared and thoroughly opened out, and the whole Village to undergo sanitary inspection. Burial Grounds and Burning Ghâts to be kept in decent order, and at a proper distance from the confines of all large Villages. Proper conservancy arrangements to be established in every Village.

The clearing of the jungle and turning up of the soil afterwards is not unattended with danger, for, in doing so, it is known that malarious emanations of great intensity are often produced, and that such spots are unhealthy for sometime afterwards.

The thick jungle ought to be burned to the ground, and the roots should be dug up, as far as it is possible, by hand labor. The ground thus cleared should be kept free of small jungle, which is apt to spring up afterwards by ploughing and cultivation.

The planting of hedges, of plantain trees, and the growth of noxious weeds and jungle of all kinds, should afterwards be prevented.

J. ELLIOT, M. D.,
Civil Assistant Surgeon,
on Special Duty.

HOOGHLY,
The 18th March 1863. }

